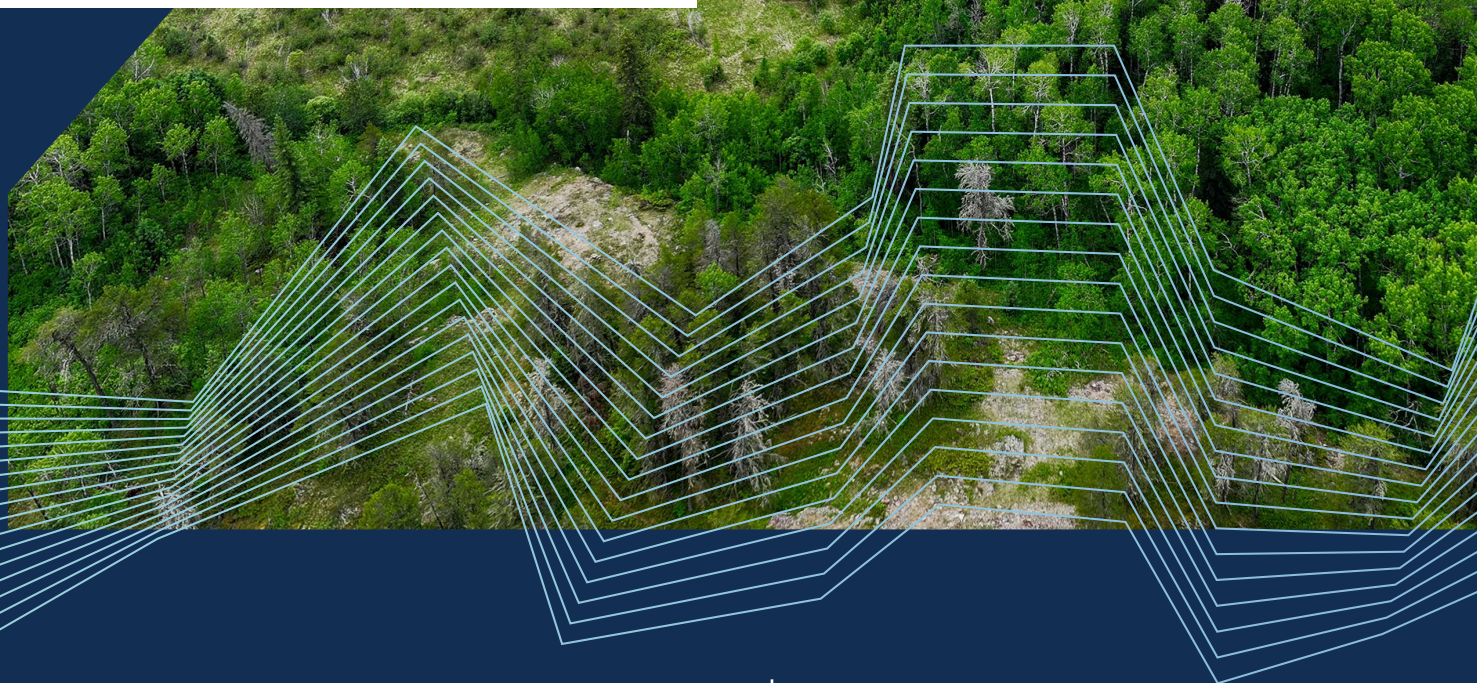




Natural Resources
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CASE STUDY: BUILDING CLIMATE RESILIENCE IN CANADA'S FOREST SECTOR



**The Northern Prairie Forests
Regional Integrated Climate
Change Assessment**

src

SASKATCHEWAN
RESEARCH COUNCIL



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Highlights

- The **Saskatchewan Research Council** (SRC), with support from Natural Resources Canada (NRCan), led a [Northern Prairie Forests Regional Integrated Climate Change Assessment](#) for an area of sustainably managed forest in Manitoba and Saskatchewan.
- SRC used climate change impact modeling and the [adaptation guidebook](#) from the **Canadian Council of Forest Ministers** (CCFM) to assess climate impacts. They also supported four forestry companies to include adaptation into their decision-making.
- Canada's forest sector continues to take action by understanding climate risks, building adaptive capacity, supporting scientific research, and implementing strategies to prepare for climate impacts.

» About this case study

Canada's forests are experiencing both risks and opportunities brought on by the effects of climate change. Climate-related disturbances such as wildfires and pest outbreaks are becoming more frequent, and alongside rising temperatures and changes to water availability, are altering how forests grow and function. These changes are in turn reshaping forested landscapes across the country. They create real consequences for the forest sector and the approximately 300 communities that depend on the forests for their livelihoods and cultural practices¹.

To help the forest industry prepare for and adapt to changing conditions, the [SRC](#), with support from [NRCan](#), led a project to assess climate vulnerability across a large, commercially managed forested area along the Saskatchewan-Manitoba border. This case study highlights the project activities and reports valuable results and lessons to guide others who are working to build a more resilient forest sector across the country.

^{1, 2} [The State of Canada's Forests Annual Report](#), Natural Resources Canada (2024)

Did you know?



In 2023, the forestry sector contributed **\$27 billion** to Canada's GDP and **exported more than \$36 billion in products**².



Sustainable Forest Management (SFM) is the guiding framework that ensures Canada's priorities for forests are met and the highest levels of sustainability are achieved³.



In 2023, Canada's forestry sector directly employed nearly **200,000 people**, including jobs for nearly **11,000 Indigenous People**⁴.

³ Learn more about sustainable forest management from [Natural Resources Canada](#) and refer to the most recent version of [The State of Canada's Forests Report](#).

⁴ [The State of Canada's Forests Annual Report](#), Natural Resources Canada (2024)



Climate change and Canada's forest sector

The forest sector has always been exposed to climate hazards and is accustomed to managing dynamic landscapes. However, changes are needed to respond to the increasing frequency and severity of climate-related disturbances and to leverage any opportunities presented by a changing climate. Companies need to carefully plan for changing future conditions, otherwise they may face **limited access to forest resources and increasing operational costs** that result from climate-related impacts.

For example, more **pest outbreaks** (e.g., emerald ash borer, spongy moth, pine beetle) are posing risks for economically important stands. More frequent **wildfires** disrupt forest operations, reduce timber supply, and affect workers in the forest sector. Wildfires can also create **supply chain challenges** and transportation backlogs for forest products, reducing trade efficiency. These disruptions cause revenue losses for companies and, in some cases, lost income for forestry workers⁵. In addition, the forest sector is facing longer-term climate impacts, such as **changes in tree species composition, stand structure, productivity and health**. The cumulative effects of these changes could decrease the productivity and resilience of Canada's forests. This would constrain the timber supply and risk the economic sustainability of the forest sector⁶.



A forest fire burns in Fernie, British Columbia, in the summer of 2023 – one of the worst forest fire seasons Canada has ever seen.

Despite the risks caused by climate change, these challenges can be overcome, and opportunities for the sector can be realized. When we increase our understanding of the risks and opportunities, we can incorporate **adaptation actions** into sustainable forest management (SFM) practices and make Canada's forests and the communities that rely on them safe, prosperous, and more resilient in the face of climate change.

What is adaptation?

Climate change adaptation refers to actions that either reduce the negative impacts of climate change or take advantage of potential new opportunities, thereby increasing resilience to a changing climate. Adaptation incorporates **future climate projections** to better prepare for what is ahead instead of relying only on historical data to guide operations and planning.

⁵ [Canada needs to get ready for a future fraught with fire: How can the forest sector respond?](#), Canadian Climate Institute (2024)

⁶ [Chapter 7: Sector Impacts and Adaptation](#), from Canada in a Changing Climate, Natural Resources Canada (2021)

>> About the project

From 2018 to 2020, the SRC partnered with the Canadian Institute of Forestry and the University of British Columbia (UBC) to lead a project called the [Northern Prairie Forests Regional Integrated Climate Change Assessment](#) (NPFRIA). The project explored the climate change vulnerability of a large, forested region in eastern Saskatchewan and western Manitoba. NRCan's [Climate Change Adaptation Program](#) provided funding and facilitated connections with adaptation experts from across Canada. Additional technical and advisory support was provided by Ducks Unlimited Canada, NRCan's Canadian Forest Service, and the provinces of Saskatchewan and Manitoba.

The NPFRIA project involved close collaboration with four forestry companies (Weyerhaeuser Saskatchewan Ltd., Edgewood Forest Products Ltd., Louisiana-Pacific Ltd. and Spruce Products Ltd.) and both provinces. A structured decision-making approach was used to guide forest managers through assessing climate vulnerability and identifying adaptation options (explained in the Tools and Resources section). The results of the NPFRIA project showed the use of this approach to embed adaptation into routine company decision-making. They also offered insights that can be applied more broadly across Canada's forest sector. The NPFRIA project highlighted the value of collaboration in problem solving through climate change, bringing together forest companies, provincial and federal governments, national organizations, and academia to complete the work.

>> Tools and resources

The NPFRIA team worked with forest managers from the four forestry companies to conduct vulnerability assessments. They used the **Canadian Council of Forest Ministers** (CCFM) guidebook, [Climate Change and Sustainable Forest Management in Canada: A Guidebook for Assessing Vulnerability and Mainstreaming Adaptation into Decision Making](#) (2015). The guidebook includes resources such as links to completed vulnerability assessments, checklists, and definitions of key terminology and concepts. The framework provides a structured decision-making approach that includes four key phases (see diagram below).

Information for each phase of the NPFRIA project was gathered from multiple sources, including existing scientific research, modeled future climate impacts to the study areas, the partner companies' internal forest management documents, and expert knowledge of forest managers and research collaborators. Workshops brought together forestry experts and managers to collaborate through each phase, leveraging all the available information and expertise. In addition to completing the first four phases of the guide, the NPFRIA team created a business case for adaptation, examining the feasibility, cost, and risks of different strategies⁷.

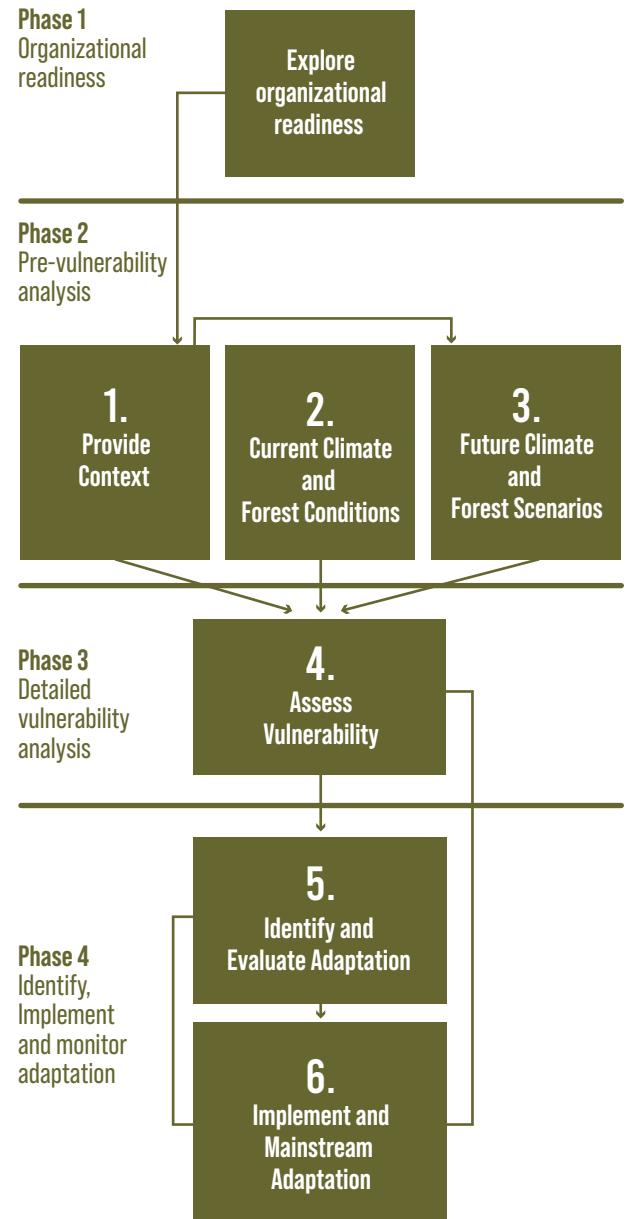
⁷ [A business case for climate change adaptation by forest industry in central Canada](#), Sheri A. Andrews-Key, Paul A. LeBlanc et Harry W. Nelson, *The Forestry Chronicle* (2021)

The climate data used in the modeling in Phase 2 came from the [Climate North America \(ClimateNA\)](#) database and from software available from the UBC forest genetics program⁸. The climate change impacts to the study areas were explored by using [LANDIS-II](#) (Landscape Disturbance and Succession, version 2). This is an open-source forest simulation model that provides information for large areas and multiple tree species. The model simulates events such as logging, fires, and insect outbreaks and predicts how the forest will respond over time. One of its unique features is its ability to remember disturbances. For example, if you have an insect outbreak in year 30 and a fire in year 50, LANDIS-II “remembers” the insect outbreak when the fire occurs and modifies the fire behaviour based on the presence of insect-killed trees. LANDIS-II was developed at the University of Wisconsin but is now maintained by the U.S. Forest Service and North Carolina State University, with many developers around the world continually contributing new modules⁹.

» Project results and impact

The NPFRIA project produced modeled projections of the future landscape under climate change to help companies understand the changes occurring on the landscape and to inform forest management decisions. The models enabled the NPFRIA project team to identify and assess vulnerabilities to climate impacts relative to the companies’ management objectives. As a result, the companies were able to rank climate vulnerabilities and adaptation priorities within each of the companies’ SFM systems.

The forest managers identified risks to the company objectives and operations, including extreme rainfall events, reduced amounts of frozen soil in winter, increasing risks of disturbance from spruce budworm, and reduced soil moisture, particularly later this century. Adaptation options were



The four phases and six components (green boxes) of adapting to climate change in the context of sustainable forest management (source: image adapted from CCFM Guidebook).

⁸ Time frames used for climate scenarios: Scenario 1 (2010–2039), Scenario 2 (2040–2069), Scenario 3 (2070–2099). The team chose to use the highest-emission climate change scenario, Representative Concentration Pathway (RCP) 8.5.

⁹ [Northern prairie forests regional integrated climate change assessment](#), Saskatchewan Research Council (2020)

Adaptation actions

In Phase 4 of the NPFRIA project, the forestry companies developed an inventory of potential adaptation actions, including:



Adjust harvest schedules to prioritize harvesting of stands most vulnerable to insect outbreaks.



Re-assess river and stream peak flows and adjust design standards for bridges and roads, reducing future risks to infrastructure.



Wherever appropriate, **allow forests to regenerate naturally** following disturbance.

developed to mitigate these risks and incorporated into day-to-day decision-making and long-term planning within the companies.

Incorporating current and future climate change projections into the SFM practices of these forestry companies shows the successful application of the CCFM guidebook approach at the forest management agreement level. The results provided the forestry companies with much needed site-specific information and actionable recommendations about climate change. As well, the results benefited the two provincial governments by helping to guide future research and policy

direction. Another benefit is that having a greater understanding of climate change impacts and potential adaptation actions has grown the expertise and capacity for climate resilience within companies and public offices involved in this work, which will continue to serve the sector for many years to come.

» Lessons learned

Several lessons were learned from conducting the project and from using the CCFM guidebook. The lessons can support other forestry companies or jurisdictions that want to improve the resilience of their operations or even other sectors embarking on similar climate change adaptation work:

- **Start from within.** The organization conducting the vulnerability assessment should be very involved in the assessment because they know their SFM system the best.
- **Use what you have.** Many of the tools and foundational pieces needed to complete the assessment are already part of forest planning and management. That may include short- and long-term reporting, internal standard operating procedures, or guidelines.
- **Stay connected.** Creating a strong network of researchers, managers and stakeholders that will be involved throughout the assessment helps to build trust between different players and ensures that actions taken consider all relevant perspectives and expertise.
- **Communicate clearly.** A clear communications plan with defined roles and expectations is crucial to ensure that all partners are on the same page as the assessment process unfolds.

» Ongoing and future work

The success of the NPFRIA project shows that climate adaptation in forestry is both possible and practical. Building on this momentum, ongoing work by the sector is focusing on:

- **Climate data.** The sector is improving access to reliable climate data, tools and resources, making it easier for communities and businesses to find, understand, and apply the information they need.
- **Indigenous practices.** Indigenous ownership, leadership, and involvement throughout the sector is leading to more widespread use of Indigenous-based forest management practices that increase climate resilience.
- **Community involvement.** The sector is involving affected and at-risk community perspectives in forest management planning, especially in the context of climate change and community safety. A [Climate Change Adaptation Guidebook for Forest Based Communities](#) is available to assist these communities.
- **Environmental, Social and Governance (ESG).** The sector is developing ways to encourage and support companies to incorporate and report on adaptation actions, to strengthen ESG performance and build investor confidence. For example, the Sustainable Forestry Initiative's [Forest Management Standard](#) includes requirements related to climate impacts and adaptation.

- **Training.** E-learning modules and micro-courses are being developed for upskilling different audiences (e.g., forest managers, planners, policymakers). For example, UBC's Faculty of Forestry and Environmental Stewardship now offers a [Micro-Certificate in Climate Vulnerability & Adaptation](#).

» Conclusion

Climate change is reshaping Canada's forests and posing new challenges and opportunities for the forest sector in Canada. This case study illustrates how Canada's forest sector is rising to the challenge to better understand climate risks and make changes to adapt. The NPFRIA project demonstrates that forest companies can assess their vulnerabilities, take informed action, and secure a more certain future by adapting to the changing climate. With the right tools, partnerships, and mindset, SFM can become a key part of Canada's climate resilience story.

**For information on the Northern Prairie
Forests Regional Integrated Climate Change
Assessment, contact sheri.andrews-key@ubc.ca.**

**For information on NRCan's Climate
Change Adaptation Program,
contact ccap-pacc@nrcan-rncan.gc.ca.**

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